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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,208	03/22/2004	Lawrence J. Malone	QUO1P001	3290
28875	7590	12/29/2004	EXAMINER	
Zilka-Kotab, PC P.O. BOX 721120 SAN JOSE, CA 95172-1120			JACKSON, BLANE J	
			ART UNIT	PAPER NUMBER
			2685	

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/807,208

Applicant(s)

MALONE ET AL.

Examiner

Blane J Jackson

Art Unit

2685

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 and 9-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arpaia et al. (U.S. Patent 6,192,225) with a view to Souetinov et al. (U.S. Patent 6,597,899).

As to claims 1-3, 6, 7 and 18-21, Arpaia teaches a method for direct conversion of a modulated radio frequency (RF) signal comprising:

Receiving an RF signal (a direct conversion receiver, column 1, lines 1-6),

Mixing the RF signal with oscillator signals with different phases in an interleaving manner (figure 2, interleaving manner of the local oscillator provided by switch (20), column 3, lines 20-35, column 4, lines 1-50). Arpaia also teaches this integrated circuit suitable for battery powered radio equipment, column 1, lines 5-25. While Arpaia teaches a quadrature two mixer down conversion receiver, Arpaia does not teach a differential mixer circuit utilizing a plurality of oscillator signals.

Souetinov teaches an image reject mixer circuit that receives a single ended RF voltage, converts the input to an amplified differential signal that is used to input two Gilbert cell type mixer cores. Souetinov further teaches each two mixer core is driven by

a differential local oscillator signal but with a 90 degree phase shift between the first and second differential local oscillator signals (differential in quadrature), figures 1, 2, 6 and column 2, lines 29-54).

It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the mixer circuits of Arpaia with arrangement of Souetinov utilizing a pair of differentially driven Gilbert mixer cores for improved noise performance and image rejection.

As to claim 4, Arpaia teaches the RF signal is modulated over a finite bandwidth (RF downconverted to baseband and frequency limited by the subsequent low pass filters (10) and (10'), figure 2, column 3, lines 53-57).

As to claim 5, Souetinov of Arpaia modified teaches an example of four local oscillator signals or two differential signals in quadrature, I LO and Q LO (Abstract) but does not specify they are 45, 135, 225 and 315 differences in phase; however, it would have been obvious to one skilled in the art at the time of the invention to utilize the differential quadrature pair of Arpaia modified in any phase value as long as the phase relationship between the four signals is maintained.

As to claim 9, Arpaia teaches the switching occurs at a rate that is faster than a bandwidth of the RF signal (column 5, lines 4-17).

As to claims 10 and 11, Arpaia teaches wherein the switching occurs in a substantially random manner (column 5, lines 4-17).

As to claims 12-14, Arpaia teaches a modulation of the RF signal is reconstructed as a baseband quadrature signal using a de-interleaving operation (figure 2, inverters (9) and (9') post modulation in the I and Q leg effectively reconstruct the I and Q components of the desired signal, column 4, lines 21-33).

As to claim 15, Arpaia teaches low-pass filtering is applied to the in-phase baseband signal and the quadrature baseband signal (figure 2, LPF's (10) and (10'), column 3, lines 53-57).

As to claim 16, Arpaia teaches a direct current offset of the I and Q baseband signal is removed (column 2, line 13 to column 3, line 6 and column 5, lines 64-67).

As to claim 17, Arpaia teaches an amplitude distortion and a phase distortion of the I and Q basebands signal are equated (attenuates distortion caused by either a constant or non constant envelop of an interferer, column 2, line 13 to column 3, line 6).

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arpaia et al. (U.S. Patent 6,192,225) and Souetinov et al. (U.S. Patent 6,597,899) with a view to Ylamurto et al. (U.S. Patent 6,545,516).

As to claim 8, Arpaia modified teaches the oscillator signals are input to the mixers in an interleaving manner by does not specifically show the interleaving manner by switching which oscillator signals are input to which mixers.

Ylamurto teaches a direct conversion receiver utilizing similar circuits as Arpaia but a different design approach where the control signal source (figure 2, (22)) is designed to directly select which oscillator signals are input to which mixer, column 5, line 30 to column 6, line 63.

It would have been obvious to one of ordinary skill in the art at the time of the invention to recognize in Arpaia modified the local oscillator signal selecting circuits of Ylamurto as an alternative design approach to better achieve a matched condition between the I and Q channels to reduce DC offset and provide enhanced image suppression.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Souetinov et al. (U.S. Patent 6,308,058) discloses an image reject mixer using two known Gilbert cell type mixer cores and differential local oscillator signals for a differential quadrature output. Ciccarelli et al. (U.S. Patent 6,785,529) discloses a method for I and Q mismatch (phase and amplitude) compensation circuit in a low IF or direct conversion receiver.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blane J Jackson whose telephone number is (703) 305-

Art Unit: 2685

5291. The examiner can normally be reached on Monday through Friday, 8:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (703) 305-4385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BJJ

Nguyen T. Vo
12-23-2004

NGUYEN T. VO
PRIMARY EXAMINER